



Attorney's Docket No.: ANDRPR/385/US

APPEAL BRIEF TRANSMITTAL FORM

In re patent application of Eric Chao XU

Serial No. 10/677,545

Examiner: Dennis R. Cordray

Filing Date: October 2, 2003

Group Art Unit: 1791

Title: Multi-Stage AP Mechanical Pulping
with Refiner Blow Line Treatment

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Honorable Sir:

TRANSMITTAL OF APPEAL BRIEF (PATENT APPLICATION – 37 C.F.R. § 41.37)

1. Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal mailed May 19, 2008 (filed May 22, 2008).
2. STATUS OF APPLICANT: This application is on behalf of:

- ☒ Large Entity
☐ Small Entity

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L. James Ristas

Reg. No. 28,663

Date: _____

July 22, 2008

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Respectfully submitted,

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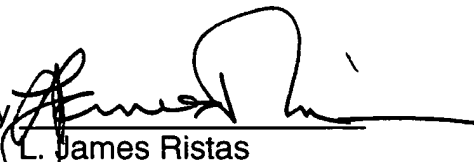
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Respectfully submitted,

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Appl. No. : 10/677,545
Applicant : Eric Chao XU
Filed : October 2, 2003
Title : MULTI-STAGE AP MECHANICAL PULPING
WITH REFINER BLOW LINE TREATMENT

TC/A.U. : 1791
Examiner : Dennis R. Cordray

Docket No. : ANDRPR/385/US
Customer No. 002543

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P.O. Box 1450
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Honorable Sir:

APPEAL BRIEF

This brief follows Applicant's Notice of Appeal filed May 22, 2008 and contains the following sections under the headings and in the order set forth below as required by 37 C.F.R. 41.37(c)(1) and MPEP 1205:

- I. REAL PARTY IN INTEREST
- II. RELATED APPEALS AND INTERFERENCES
- III. STATUS OF CLAIMS
- IV. STATUS OF AMENDMENTS
- V. SUMMARY OF CLAIMED SUBJECT MATTER
- VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL
- VII. ARGUMENT
- VIII. CLAIMS APPENDIX
- IX. EVIDENCE APPENDIX
- X. RELATED PROCEEDINGS APPENDIX

The final page of Section VII bears the signature of Appellant's attorney.

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I. REAL PARTY IN INTEREST

The real party in interest is the assignee of record, Andritz Inc.

II. RELATED APPEALS AND INTERFERENCES

There is currently an appeal pending on the parent of the subject application:

U. S. App. No. 10/483,648

Filed January 13, 2004

"Four Stage Alkaline Peroxide Mechanical Pulping"

There are no known interferences or judicial proceedings related to the subject application.

III. STATUS OF CLAIMS

A. STATEMENT OF STATUS OF ALL CLAIMS IN THIS PROCEEDING

Independent claim 1 with associated dependent claims 2-16, 44, 45 and 50-52 are pending;

Independent claim 18 with associated dependent claims 19 and 20 are pending;

Independent claim 21 with associated dependent claims 22, 23, 28-34, 46 and 47 are pending;

Independent claim 36 with associated dependent claims 37, 38, 48 and 49 are pending;

Independent claim 42 with associated dependent claim 43, are pending.

Claims 17, 24-27, 35, and 39-41 have been cancelled

B. CLAIMS ON APPEAL

Claims 1-16, 18-23, 28-34, 36-38, and 42-52 are the subject of this Appeal.

IV. STATUS OF AMENDMENTS

All amendments presented in Applicant's Response filed December 3, 2007 were entered. A final Official Action rejecting these claims was mailed February 20, 2008 (hereinafter, "Final Action"), and these are the claims subject to this Appeal.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The invention as defined in all independent claims is directed to the introduction of sodium hydroxide alkali and hydrogen peroxide (NaOH AP) after a primary pressurized (independent claims 1, 18, 21, 36), or other pressurized (claim 42) refiner, in combination with applying NaOH AP impregnation pre-treatment to lignocellulosic material before refining. The addition after the refiner, is to the stream of pulp in the blow line. Applicant adds these chemicals in the blow line to mix the chemicals and cellulosic material without the agitation of the refiner or other mechanical action. This non-mechanical mixing in the blow line enables chemicals to enter the wood and be present in the slurry as it enters the downstream bleaching retention vessel without mechanical agitation. Whereas the intermediate line extends from the refiner to the retention vessel or tower, the blow line extends between the blow valve and the next processing apparatus, such as a pulp separator (see par. [0042] of the published application).

The preferred embodiment of the present invention is exemplified in Example Set C (up to 4.3 bar/62 psi pressurized primary refiner) and Figures 11 and 17, as an improvement on the invention of the parent application exemplified in Example Set A (atmospheric primary refining), Example Set B (atmospheric primary refiner and low pressure primary refiner), and Figures 1-10. Each independent claim is summarized below with support indicated with reference to the paragraph number or figure in the published application.

As will be explained more fully below, significant difficulties are presented for achieving cost-effective production of chemi-mechanical pulp with commercially acceptable brightness, in pressurized disc refiner systems. Applicant's own initial efforts with NaOH AP pretreatment and NaOH AP at the

refiner, showed considerable promise under atmospheric and low pressure conditions (Example Sets A and B).

As set forth in par. [0088], Example Set C shows the surprising results that even in a highly pressurized system, bleaching efficiency similar to that shown in Example Sets A and B (atmospheric refiner inlet pressure) can be achieved by shifting NaOH AP injection from the refiner eye to the refiner blow line. This concept as defined in the claims, is not readily derivable from the cited references.

Claim 1 is directed to an alkaline peroxide mechanical pulping process comprising the steps of feeding a lignocellulosic material into a first press, pressing the lignocellulosic material, discharging the lignocellulosic material from the first press, impregnating the lignocellulosic material discharged from the first press with a first sodium hydroxide alkaline peroxide pretreatment solution and maintaining the impregnation for a first reaction time. [0036, 0040] The subsequent steps are feeding the impregnated lignocellulosic material to a refiner having an inlet and a rotating disc within a superatmospheric casing, where the impregnated lignocellulosic material is refined to form a primary pulp having a temperature of at least about 80C, and delivering a stream of primary pulp from the superatmospheric casing to a blow line while the primary pulp temperature is at least about 80C [0041, 0042]. A sodium hydroxide alkaline peroxide solution is added to the stream of primary pulp in the blow line while the primary pulp temperature is at least about 80C [0043, 0052, and 0091]. Thereafter the blow line solution and the stream of primary pulp forms a reaction mixture in the blow line [0044, 0052], with discharge of the reaction mixture having a temperature of at least about 80C into a retention vessel [0047, 0053] (Fig. 11). The mixture of pulp and sodium hydroxide alkaline peroxide solution is retained in the retention vessel to produce a bleached material [0053].

Claim 18 is also directed to an alkaline peroxide mechanical pulping process with a primary refiner having a superatmospheric casing [0044, 0045], by refining a lignocellulosic material that has been pretreated and impregnated with at least a first sodium hydroxide alkaline peroxide pretreatment solution

[0039, 0040], discharging the lignocellulosic material at temperature of at least about 80C into a blow line [0041, 0042] having at least one solution inlet port [0043]. A sodium hydroxide alkaline peroxide blow line solution is injected through the at least one solution inlet port, [0043], thereby mixing the blow line solution and the lignocellulosic material in the blow line [0044, 0052]. The lignocellulosic material is discharged from the blow line at a temperature of at least about 80C [0047, 0053, Fig. 11], and the discharged lignocellulosic material is maintained therein for a reaction period. [0044]

Claim 21 is directed to an alkaline peroxide mechanical pulping process comprising the steps of feeding a lignocellulosic material into a first press, pressing the lignocellulosic material, discharging the lignocellulosic material from the first press, and impregnating the lignocellulosic material discharged from the first press with a first sodium hydroxide alkaline peroxide pretreatment solution and maintaining the impregnation for a first reaction time [0039, 0040]. The impregnated material is to a refiner having an inlet and a rotating disc within a superatmospheric casing, and refined to form a primary pulp [0041, 0042, 0091]. The stream of primary pulp is discharged from the superatmospheric casing to a blow line [0041, 0042], where a sodium hydroxide alkaline peroxide blow line solution is added to the stream of primary pulp immediately after the blow valve [0043, 0052] and Fig. 11. The blow line solution and the stream of primary pulp are mixed to form a reaction mixture [0044, 0052], which is discharged into a retention vessel [0047, 0053, Fig. 11] and retained therein to produce a bleached material [0053].

Claim 36 is directed to an alkaline peroxide mechanical pulping process in a primary refiner having a superatmospheric casing [0044, 0045], by refining a lignocellulosic material that has been pretreated and impregnated with at least a first sodium hydroxide alkaline peroxide pretreatment solution into a primary pulp having a temperature in the range of about 90C to about 155C and a consistency of about 20 to about 60% [0042] [original claim 8]. The material is discharged through a blow valve into an intermediate line in fluid communication with at least a first further pulp processing apparatus for separating [0042], cleaning, pressing

[0045, Fig. 18], bleaching [0053], or refining [0049] the primary pulp and having at least one solution inlet port upstream of said further apparatus. Sodium hydroxide alkaline peroxide is injected into the intermediate line through the at least one solution inlet port at a temperature below about 80C [0045], with mixing of the intermediate line solution and the lignocellulosic material in the intermediate line upstream of said further apparatus [0044, 0052, Fig. 18]. The lignocellulosic material is discharged from the intermediate line and then retained for a reaction period [0044, 0053].

Claim 42 is directed to an alkaline peroxide mechanical pulping process in a refiner having a casing, by additionally refining a lignocellulosic based material that has been previously pretreated and impregnated with at least a first sodium hydroxide alkaline peroxide pretreatment solution and which has been previously refined [Fig. 18, 0008, 0044]. The material is discharged through a blow valve into an intermediate line in fluid communication with at least a first further pulp processing apparatus for separating [0042], cleaning, pressing [0045, Fig. 18], bleaching [0053], or refining [0049] the primary pulp and having at least one solution inlet port upstream of said further apparatus [0043]. Sodium hydroxide alkaline peroxide solution is injected in the intermediate line through the at least one solution port [0043], with mixing of the intermediate line solution and the lignocellulosic based material in the intermediate line upstream of said further apparatus [0044, 0053]. The material is then discharged from the intermediate line, and retained for a reaction period [0044, 0053].

[This Space Intentionally Left Blank]

As a convenience, the key features of the independent claims are more concisely summarized below:

Claim 1 includes the key recitations of

- Pressing then sodium hydroxide AP impregnation of feed material
- Supercritical primary refiner produces pulp
- Sodium hydroxide AP mixed with primary pulp at blow line >80C
- Pulp delivered at >80C and retained to produce bleached material

Claim 18 includes the key recitations of

- Pretreating then sodium hydroxide AP impregnation of feed material
- Supercritical primary refiner produces pulp
- Sodium hydroxide AP mixed with primary pulp at blow line >80C
- Pulp delivered at >80C and held for reaction period

Claim 21 includes the key recitations of

- Pressing then sodium hydroxide AP impregnation of feed material
- Supercritical primary refiner produces pulp
- Sodium hydroxide AP added to and mixed with primary pulp stream immediately after blow valve
- Mixture retained to produce bleached material

Claim 36 includes the key recitations of

- Pretreating then sodium hydroxide AP impregnation of feed material
- Supercritical primary refiner produces pulp at 90-155 C and 20-60% consistency
- Pulp discharged through blow valve into intermediate line
- Sodium hydroxide AP at <80C injected through port(s) into and mixed with primary pulp upstream of any further apparatus
- Pulp discharged from intermediate line and retained for a reaction period

Claim 42 includes the key recitations of

- Additionally refine material after pretreating, sodium hydroxide AP impregnation, and primary refining of feed material
- Additionally refined material discharged through blow valve into intermediate line
- Sodium hydroxide AP injected into intermediate line and mixed with primary pulp upstream of any further apparatus
- Pulp discharged from intermediate line and retained for a reaction period (before being additionally refined)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-11, 18-23, 28-29, 36-38, 42-52 stand rejected under 35 USC §103 on the basis of the disclosure of U.S. 6,743,332 (Haynes) in view of the disclosure of the technical paper of Cannell, further in view of the disclosure of U.S. 4,486,267 (Prusas).

Claims 12-16 and 30-34 stand rejected under 35 U.S.C. §103 on the basis of Haynes, Cannell and Prusas, further in view of the disclosures of US 3,023,140 (Textor), US 4,270,976 (Sandstrom) and the technical paper to Xu (Xu).

VII. ARGUMENT

A. THE EXAMINER HAS NOT PROPERLY APPLIED THE LEGAL REQUIREMENTS FOR A REJECTION UNDER 35 U.S.C. §103

1. The Examiner Has The Burden Of Establishing A *Prima Facie* Case Of Obviousness Within The Legal Requirements Created By The Courts.

The rejections of all claims rely on the propriety of the manner in which the disclosures of the Haynes, Cannell and Prusas references have been combined. If, as applicant contends, such combination is improper, the rejections of all claims must be reversed.

The courts have established the legal concept of *prima facie* obviousness. As summarized in MPEP §2142, "the legal concept of *prima facie* obviousness is a procedural tool of examination which . . . allocates who has the burden of going forward with the production of evidence in each step of the examination process." The MPEP further states, "the Examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the Examiner does not produce a *prima facie* case, the Applicant is under no obligation to submit evidence of nonobviousness."

The Court of Appeals for the Federal Circuit has on many occasions spoken on the examiner's burden, as represented by the following citations from *In re Lee*, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002), such as at 1433-1434:

- Particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed. *See, e.g., In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000)
- Even when the level of skill in the art is high, the Board must identify specifically the principle, known to one of ordinary skill, that suggests the claimed combination. In other words, the Board must explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious. *In re Rouffet*, 149 F.3d 1350, 1359, 47 USPQ2d 1453, 1459 (Fed. Cir. 1998)
- The Examiner can satisfy the burden of showing obviousness of the combination only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. *In re Fritch*, 972 F.2d 1260, 1265, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992).

According to the MPEP §§2142 and 2143, to reach a proper determination under 35 U.S.C. §103, the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention "as a whole" would have been obvious at the time to that person.

Knowledge of applicant's disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the "differences," conduct the search and evaluate the "subject matter as a whole" of the invention. The tendency to resort to "hindsight" based upon applicant's disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art.

The Supreme Court in *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1395-97 (2007) identified a number of rationales to support a conclusion of obviousness which are consistent with the proper "functional approach" to the determination of obviousness as laid down in *Graham*. The key to supporting any rejection under 35 U.S.C. §103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR* noted that the analysis supporting a rejection under 35 U.S.C. §103 should be made explicit.

2. The Context Of Appellant's Claims Has Not Been Fully Appreciated By Examiner.

The mechanical refining of wood chip material to produce primary pulp for use in e.g., paper making, has been practiced for many decades. The desired pulp consists essentially of wood fibers that have been separated from each other and fibrillated to at least some degree. For use in making printing paper, the pulp should have high brightness, as well as strength. In a so-called chemimechanical refining line, especially alkaline-peroxide (AP) mechanical refining, chemical reactions are relied upon in addition to the essentially grinding action of the refiner, to produce a pulp that is both strong and bright. Of course, for a given quality of pulp, the skilled artisan tries to minimize the usage (quantity and cost) of equipment, chemicals, and energy.

In pressurized (superatmospheric) refiners, the chips pass between closely spaced, relatively rotating discs, with the resulting friction generating high

heat and the release of saturated steam, which increases the pressure correspondingly. The pressure and associated temperature profile as the refining progresses radially along the faces of the discs increase rapidly. The refined pulp is entrained in saturated steam as together they are discharged at high pressure from the refiner casing into the blow valve. High pressure, high consistency refining has many advantages over atmospheric/low pressure refining, but a major disadvantage is the darkening of the chips due to the high temperature.

Bleaching is necessary to achieve acceptable brightness, and hydrogen peroxide is the most commonly used bleaching agent. Generally, bleaching is performed after refining (see Haynes col. 2 ln. 18). An alkaline solution, most commonly sodium hydroxide solution, is used as a pretreatment to swell the chips as an aide to the comminution of the chips and fibers in the refiner, and is thus typically introduced before or into the refiner. Sodium hydroxide can also contribute to the effectiveness of the hydrogen peroxide bleaching (see Haynes col. 2, ln. 31). However, in pressurized refiners, this poses one particular problem, as set forth in col.2, lns. 46-60 of Haynes: At the higher temperatures of pressurized refiners, the hydrogen peroxide breaks down more quickly and the presence of the alkali darkens the fibers, both of which undermine the desired brightening.

In the first paragraph of his Summary, Haynes addresses this problem by substituting an alkali buffer for all or most of the sodium hydroxide, at every point where AP might be introduced. Haynes does not disclose, teach, or suggest that any synergy with post-refiner AP can arise if the chip processing with AP upstream of the refiner is performed with pressing impregnation. There is no basis in any reference that would motivate one of ordinary skill to add expensive equipment for pre-refiner pressing and AP impregnation to the Haynes process; Haynes teaches that satisfactory results in a system of high pressure primary refiner followed by a secondary refiners can be achieved by reducing the detrimental temperature effects on the bleaching, solely via a change in the composition of the alkaline.

3. The Examiner Has Resorted To Impermissible Hindsight To Combine Haynes, Cannell, and Prusas and Has Thus Failed To Establish A *Prima Facie* Case Of Obviousness Against the Claims.

35 U.S.C. §103 specifies that the obviousness of an invention is to be determined as of “the time the invention was made.” This requires the Examiner to step backward in time and into the shoes worn by the hypothetical person of ordinary skill in the art when the invention was unknown and just before it was made.

Thus, although the examiner views the Haynes reference as teaching that AP solution can be introduced anywhere before, at, and after the refiner, even Haynes recognizes that such view is an oversimplification. His examples do not introduce AP upstream of the refiner. Many practitioners have attempted to improve upon AP mechanical pulping processes, so the field is admittedly crowded, with many variations on the pretreatment, refining, and post-refining stages. However, this crowding and continual effort toward improvement confirms that practitioners hope that even subtle differences can have significant consequences, but that such practitioners cannot expect to start with one known process, arbitrarily pick among sub-features of other known processes, and expect significant improvement over the first process.

This is all the more reason that the legal standards for sustaining a rejection under 35 USC §103 must be strictly adhered to. First, there must some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the references. As set forth in greater detail below, in such a crowded art, the Haynes, Cannell, and Prusas references take very different approaches to chemimechanical pulping and should not be presumed to have compatible process steps. Second, there must be some reasonable basis for an expectation of success in this crowded field. There is nothing in Haynes, Cannell, and Prusas to suggest that interchanging any process steps would improve the results of either process.

The examiner has improperly relied on hindsight reconstruction based on Applicant's disclosure. This is evident from the examiner's changing view of over the course of prosecution, as to how the three references should be combined. Even in the previous Office Action (July 30, 2007, numbered page 2, first paragraph), the rejection was based on the examiner's concession that, "upon further consideration, new grounds of rejection [using the same references] have been made in view of a modified interpretation of the cited prior art." The examiner thus appears to acknowledge that Prusas is incompatible with Haynes, so switched the order with Cannell and used Prusas merely as relevant general knowledge. Furthermore, as set forth on page 6 thereof, the examiner relies on the teaching of Cannell with respect to BCTMP (bleached chemical thermomechanical pulp) as modifying Haynes, but as will be explained below, Cannell distinguishes BCTMP from the APP (alkaline peroxide pulp) process such as Haynes.

For the reasons that the examiner is not only picking and choosing from incompatible references, but also is changing the way these references are being applied, applicant believes impermissible hindsight was used in an effort to build a *prima facie* case, but that no legally proper *prima facie* case of nonobviousness has been established. The citation of *In re McLaughlin* by the examiner in the Final Action, refers to a 1971 decision by the predecessor court to the currently controlling court (Court of Appeals for the Federal Circuit) and should be given less weight than the current MPEP and later cases cited herein.

B. EVEN IF ONE OF ORDINARY SKILL HAD REASON TO CONSIDER CANNELL AS A POTENTIAL MODIFICATION TO HAYNES, THERE IS NO SUPPORT FOR A REASONABLE COMBINATION INCLUDING PRUSAS THAT WOULD RESULT IN THE CLAIMED INVENTION

There is no nexus among the references, which would teach or suggest to one of ordinary skill, that any particular advantage would be gained by introducing AP at both the pretreatment and the blowline. Moreover, applicant

will show that the processes described in Haynes, Cannell, and Prusas, are incompatible and are not combinable to arrive at applicant's claimed invention.

The rejection of all independent claims is premised on (1) Haynes as a basic reference that allegedly addresses an analogous problem or objective, by introducing AP at multiple points in a refining line, (2) compatible teachings in Cannell concerning BCTMP, and (3) general knowledge possessed by one of ordinary skill as exemplified by Prusas. The rejections are not based on any nexus of teachings, suggestions or motivations among the references for combining the NaOH AP pretreatment and the NaOH AP blowline introduction claimed by Applicant, but rather on vague general knowledge motivating one of ordinary skill to modify Haynes in a manner resulting in Applicant's claimed invention.

When addressing pressurized refiner systems, Haynes, Cannell, and Prusas are trying to eliminate NaOH in the refiner and blow line. Haynes eliminates the sodium hydroxide by substituting other compounds, whereas Applicant is trying to improve the effectiveness of NaOH as used with hydrogen peroxide throughout the pretreatment, refining, and post refining processes.

C. SPECIFIC ERRORS OF REJECTION FOR EACH OF THE CLAIMS.

Claims 1-11, 18-23, 28-29, 36-39 and 42-52 stand rejected under 35 USC §103 on the basis of the disclosure of U.S. 6,743,332 (Haynes) in view of the disclosure of the technical paper of Cannell, further in view of the disclosure of U.S. 4,486,267 (Prusas).

The rejections under 35 USC §103(a) are improper because there is insufficient disclosure, teaching or suggestion for one of ordinary skill in the relevant field to select and combine the features of Haynes, Cannell and Prusas as selected and combined by the examiner.

Claim 1

As set forth in paragraph [0010] of applicant's specification, when a substantial fraction of the overall NaOH AP is applied at or near the blow valve in the post refiner intermediate line, in combination with the NaOH AP pressing/impregnation of the chips upstream of the refiner, better energy efficiency and more efficient bleaching are achieved. By moving a greater number of chemical reactions downstream relative to conventional techniques, with the improved mixing at the blow valve or at least the blow line, the AP can perform its chemical bleaching with far less a degradation which would otherwise occur with AP introduction at or upstream of the refiner in a high pressure refining system. The effectiveness of the NaOH AP introduction at the blow line is very much dependent on the pretreatment NaOH AP impregnation steps recited in Applicant's claims.

The examiner concedes that the basic reference, Haynes, does not disclose or teach this. Other than washing, the only pretreatment disclosed in Haynes appears in col. 11 Ins. 47-60, as steaming at preheater 210 of Fig. 2 with associated bleaching liquor introduction 263 at 210 as described in col. 12, Ins. 39-62. It is clear from the latter paragraph that bleaching liquor can be introduced at any combination of 260 at the refiner 216; 261 in a conveyor 220 to the refine; 262 in the blow line 224; as well as 263 in the preheater 210. Haynes does not explicitly teach any preference for how the bleaching liquor is to be distributed, but the preferred embodiment can be inferred from the examples.

In the test plan of Fig. 4 and results in Figs. 6-15, in some runs alkali only (not AP) was added at the primary refiner, with the remaining bleach components added at the blowline or interstage section, whereas in the other runs no alkali was introduced at the refiner and all bleach components were added at the blowline or interstage section (see col. 15 Ins. 29-38).

According to col. 12, Ins. 45-49, "at the primary refiner" means any steps up to and including the primary refiner. In Table 1, every instance of chemicals added in primary refining, is limited to an alkali (i.e., only the "A" part of AP); there is no run in which any kind of AP solution is added upstream of or in the

primary refiner. In these runs, the combination is either A at the refiner and P at the intermediate line, or nothing at the refiner and AP in the intermediate line.

Thus, not only is there no disclosure in any one reference of NaOH AP pretreatment including pressing and impregnation upstream of the pressurized refiner, followed by NaOH AP addition in the blow line, but furthermore, there is no basis among the references for one of ordinary skill to appreciate the particularly efficacious results arising from the combination of such pretreatment with such blow line addition.

The examiner has evidently taken the position that Haynes teaches AP introduction in a refiner pretreatment step and in a post refiner blowline injection step. From this basic premise the examiner looks to Cannell and Prusas to supply the critical feature that one of ordinary skill would recognize the efficacy of the pretreatment including pressing and NaOH AP impregnation in combination with NaOH AP at the blowline. However, the analysis under 35 USC §103 must not merely piece together elements taken arbitrarily from different references.

Applicant asserts that the foregoing summary of the Haynes reference, points to three teachings: (1) In alkaline peroxide type chemi-mechanical pulping, a different type of (buffering) alkali should be substituted for sodium hydroxide, (2) the substituted alkali should be introduced before or in the primary refiner, and (3) the substituted alkaline and peroxide combination should be introduced after the primary refiner. Without impermissible use of applicant's claims as a blue print for analyzing the Haynes reference, one of ordinary skill (and thus the examiner) should view the Haynes process as teaching introduction of an A refiner solution and an AP blowline solution.

This renders even more tenuous any nexus by which the pressing and AP impregnation step in either Cannell or Prusas can properly be grafted onto Haynes.

On the first page of the copied document, Cannell distinguishes BCTMP (bleached chemi-thermomechanical pulp) from APP (alkaline peroxide pulp), in that the former impregnates the chips with sodium sulfite and refining is at pressure, followed by bleaching, whereas in the latter, alkaline peroxide is used

to impregnate the chips and refining is done atmospherically. In other words, Crannell teaches away from AP in pressurized refiner systems. Also, Crannell's statement (in the column under Table 5) that APP can include varying the alkali/peroxide split between impregnation and the post-bleach tower is thus applicable only to non-pressurized systems, which do not have a blow valve. Furthermore, in contrast to applicant's desire to move the AP reactions downstream, the last paragraph of Cannell, implies that in the APP process the front end needs high loading of the AP.

Of the three references, only Prusas fairly discloses AP impregnation upstream of a pressurized refiner, but he clearly teaches the removal of the AP and further pretreatment by sodium sulfite cooking before refining.

Thus, although Haynes describes a pressurized primary refiner, he teaches away from using sodium hydroxide as the alkali component in a pressurized AP refiner pulping system. Cannell and Prusas similarly teach away from using any AP impregnation in a pressurized system (at least without removing the AP before refining per Prusas).

For these reasons, the combination of pressing and NaOH AP impregnation pretreatment in a pressurized primary refiner followed by NaOH AP injection in the blow line, defines patentable subject matter relative to Haynes, Cannell and Prusas under 35 USC §103.

Claim 2

None of the references teaches a two stage pretreatment of pressing and NaOH AP impregnation, which together with the other limitations of claim 1, further distinguishes from Haynes, Cannell, and Prusas. To the extent Prusas discloses a two stage pretreatment, the second stage removes the AP from the first stage and cooks the material in a sodium sulfite. This is incompatible and thus not properly combinable with the other references.

Claims 3, 4, and 5

These claims stand or fall with claim 1.

Claim 6

Although Haynes discloses introduction of AP in the blow line, it does not disclose that the location should be immediately after the blow valve. This location provides the maximum mixing effect of the AP with the primary pulp, at reduced temperature relative to the casing, even while the pulp is still entrained in the steam flow out of the refiner casing. (See par. [0052])

Claims 7-11

These claims stand or fall with claim 1

Claims 12-16

These claims were rejected under 35 U.S.C. §103 on the basis of Haynes, Prusas, and Cannell (Haynes, Cannell and Prusas?) plus the disclosures of three other patents or publications. These claims depend from claim 2, discussed above, and stand or fall with claim 2. Applicant repeats the point that the fundamental basis for the rejection, the combination of Haynes, Cannell, and Prusas is fatally flawed. Therefore, if the independent claim 1 and/or dependent claim 2 are patentable over the cited combination under 35 U.S.C. §103, claims 12-16 are likewise patentable under 35 U.S.C. §103.

Claim 18

Claim 18 is patentable for the same reasons as set forth above with respect to claim 1. Claim 18 does not specifically recite that the pretreatment includes "pressing", but it does recite that the material is impregnated with an NaOH AP solution. The combination of NaOH AP impregnation upstream of the refiner and NaOH AP injection in the blowline, cannot be readily derived from the cited references.

Claim 19

This claim stands or falls with claim 18.

Claim 20

Although Haynes discloses introduction of AP in the blow line (but not NaOH AP), it does not disclose that the location should be immediately after the blow valve. This location provides the maximum mixing effect of the NaOH AP with the primary pulp, even while the pulp is still entrained in the steam flow out of the refiner casing. With the recitations of claim 18, this claim should be patentable.

Claim 21

This claim is patentable for the same reasons as claim 1, with the further limitation (per claim 6) of the AP injection immediately after the blow line. Although Haynes discloses introduction of AP (but not NaOH AP) in the blow line, it does not disclose that the location should be immediately after the blow valve. This location provides the maximum mixing effect of the NaOH AP with the primary pulp, even while the pulp is still entrained in the steam flow out of the refiner casing.

Claim 22

As with claim 2, none of the references teaches a two stage pretreatment of pressing and NaOH AP impregnation, which together with the other limitations of claim 1, further distinguishes from Haynes, Cannell, and Prusas. To the extent Prusas discloses a two stage pretreatment, the second stage removes the AP from the first stage and cooks the material in a sodium sulfite. This is incompatible and thus not properly combinable with the other references

Claim 23

This claim stands or falls with claim 21.

Claim 28

This claim specifies that the refiner is not only pressurized, but at a high pressure corresponding to at least 35 psi. This renders the Cannell reference even more inapplicable, in that the disclosure therein concerning APP is limited to atmospheric refining.

Claim 29

This claim stands or falls with claim 21.

30-34

These claims were rejected under 35 U.S.C. §103 on the basis of Haynes, Prusas, and Cannell (Haynes, Cannell and Prusas?) plus the disclosures of three other patents or publications. These claims depend from claim 22, discussed above, and stand or fall with claim 22. Applicant repeats the point that the fundamental basis for the rejection, the combination of Haynes, Cannell, and Prusas is fatally flawed. Therefore, if the independent claim 21 and/or dependent claim 22 are patentable over the cited combination under 35 U.S.C. §103, claims 30-34 are likewise patentable.

Claim 36

This claim is similar to claim 18, except that the no temperature limit is recited. Claim 36 does not specifically recite that the pretreatment includes "pressing", but it does recite that the material is impregnated with an NaOH AP solution. The combination of NaOH AP impregnation upstream of the refiner and NaOH AP injection in the blowline, cannot be readily derived from the cited references.

Claim 37

This claim stands or falls with claim 36

Claim 38

This claim recites a limitation similar to that of claim 6. Although Haynes discloses introduction of AP in the blow line, it does not disclose that the location should be immediately after the blow valve. This location provides the maximum mixing effect of the NaOH AP with the primary pulp, even while the pulp is still entrained in the steam flow out of the refiner casing. (See par. [0052])

Claim 42

This claim is directed to a second stage refining after a prior stage refining of material that had been pretreated and impregnated with NaOH AP. The additionally refined material is discharged through a blow valve (inherently specifying pressurized discharge from the casing), injected with NaOH AP in the intermediate line and the mixture is retained for a reaction period before it passes to the further apparatus. Haynes does not disclose or teach AP injection after the second stage refiner.

Claim 43

Claim 43 stands or falls with claim 42

Claim 44

None of the references teach or suggest NaOH AP pressing/impregnation pretreatment and NaOH AP injection in the blowline (per claim 1), and especially such high loading of the NaOH AP at the blowline as recited in claim 44.

Claim 45

None of the references teach or suggest NaOH AP pressing/impregnation

pretreatment and NaOH AP injection in the blowline (per claim 1), with some NaOH AP introduced into the refiner (per claim 3) and especially with such high loading of the NaOH AP at the blowline as recited in claim 44.

Claim 46

None of the references teach or suggest NaOH AP impregnation pretreatment and NaOH AP injection immediately after the blow valve in the blowline (per claim 21), and especially such high loading of the NaOH AP immediately after the blow valve at the blowline as recited in claim 46.

Claim 47

None of the references teach or suggest NaOH AP impregnation pretreatment and NaOH AP injection immediately after the blow valve in the blowline (per claim 21), with some NaOH AP introduced into the refiner (per claim 23) and especially with such high loading of the AP at the blowline as recited in claim 48.

Claim 48

None of the references teach or suggest NaOH AP impregnation pretreatment and NaOH AP injection in the blowline (per claim 36), and especially such high loading of the NaOH AP at the blowline as recited in claim 48.

Claim 49

None of the references teach or suggest NaOH AP impregnation pretreatment and NaOH AP injection immediately in the blowline (per claim 37), with some NaOH AP introduced into the refiner (per claim 37) and especially with such high loading of the NaOH AP at the blowline as recited in claim 49.

Claim 50

This claim further limits claim 1 to the specified conditions of the pulp

associated with pressurized refining and the retention vessel, rendering the Cannell reference even less applicable.

Claim 51

This claim further limits claim 50 with the preferred feature of the relatively high loading of the AP solution in the blowline, contrary to the teaching of Cannell.

Claim 52

Claim 52 is a combination of claim 1, 5, 51 with the further recitation constituting two NaOH AP impregnations, further differentiating from Cannell and Prusas.

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D. CONCLUSION

For the foregoing reasons, applicant contends that (1) one of ordinary skill in the relevant field would not attempt to combine the disclosures or teachings of Hynes, Cannell, and Prusas under the legal standards applicable to 35 USC §103, (2) the examiner has relied on impermissible hindsight reconstruction based on applicant's specification to make this combination as the foundation for all rejections, and (3) the claims recite a unique and non-obvious series of steps by which NaOH AP is used in a pressurized disc refiner system to produce pulp having satisfactory brightness.

Applicant requests that the Board reverse the examiner on all grounds.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

1. An alkaline peroxide mechanical pulping process comprising the steps of:

feeding a lignocellulosic material into a first press;

pressing the lignocellulosic material;

discharging the lignocellulosic material from the first press;

impregnating the lignocellulosic material discharged from the first press with a first sodium hydroxide alkaline peroxide pretreatment solution and maintaining the impregnation for a first reaction time;

feeding the impregnated lignocellulosic material to a refiner having an inlet and a rotating disc within a superatmospheric casing;

refining the impregnated lignocellulosic material to form a primary pulp having a temperature of at least about 80C;

delivering a stream of primary pulp from the superatmospheric casing to a blow line while the primary pulp temperature is at least about 80C;

adding a sodium hydroxide alkaline peroxide blow line solution to the stream of primary pulp in the blow line while the primary pulp temperature is at least about 80C;

mixing the blow line solution and the stream of primary pulp to form a reaction mixture in the blow line;

discharging the reaction mixture having a temperature of at least about 80C into a retention vessel;

retaining the reaction mixture in the retention vessel to produce a bleached material.

2. The alkaline peroxide mechanical pulping process of claim 1 further comprising;

feeding the lignocellulosic material that has been impregnated with the first pretreatment solution for a first reaction time, into a second press;

pressing and discharging the lignocellulosic material from the second press;

impregnating the lignocellulosic material discharged from the second press with a second sodium hydroxide alkaline peroxide pretreatment solution and maintaining the second impregnation for a second reaction time.

3. The alkaline peroxide mechanical pulping process of claim 1 further comprising adding a sodium hydroxide alkaline peroxide refiner solution to the lignocellulosic material at the refiner.

4. The alkaline peroxide mechanical pulping process of claim 1, wherein the step of feeding the impregnated lignocellulosic material to a refiner having an inlet and a rotating disc within a superatmospheric casing includes maintaining the superatmospheric casing at a pressure of at least about 240kPa.

5. The alkaline peroxide mechanical pulping process of claim 1, wherein the step of mixing is immediately followed by introducing the mixture into a separator and the separated pulp is then discharged into said retention vessel.

6. The alkaline peroxide mechanical pulping process of claim 1, wherein the step of adding an alkaline peroxide blow line solution to the stream of primary pulp includes adding the blow line solution immediately after the blow valve.

7. The alkaline peroxide mechanical pulping process of claim 5, wherein the step of adding an alkaline peroxide blow line solution to the stream of primary pulp includes adding the blow line solution immediately prior to the separator.

8. The alkaline peroxide mechanical pulping process of claim 1, wherein the step of delivering a stream of primary pulp from the

superatmospheric casing to the blow line further includes the primary pulp having a temperature in the range of about 90C to about 155C and a consistency of about 20 to about 60%.

9. The alkaline peroxide mechanical pulping process of claim 1, wherein the reaction mixture is retained in the retention vessel at a temperature of about 60C to about 95C and a consistency of about 20% to about 40%.

10. The alkaline peroxide mechanical pulping process of claim 1, wherein the reaction mixture is retained in the retention vessel at a temperature of about 85C to about 95C, and a consistency of about 30%.

11. The alkaline peroxide mechanical pulping process of claim 1, wherein the impregnation solution contains sodium hydroxide, peroxide, and stabilizer; the blow line solution contains sodium hydroxide, peroxide, and stabilizer; and said blow line solution has a temperature less than about 80C.

12. The alkaline peroxide mechanical pulping process of claim 2, wherein the first impregnation solution contains 0.3% DTPA; the second impregnation solution contains by weight per cent 0.2% MgSO₄, 4.4% silicate, 2.8% TA, and 2.8% H₂O₂; and the blow line solution contains by weight per cent 0.16% DTPA, 0.16% MgSO₄, 2.3% silicate, 1.8% TA with 0.5% being residual, 2.4% H₂O₂ with 1.1% being residual.

13. The alkaline peroxide mechanical pulping process of claim 2, wherein the first impregnation solution contains by weight per cent 0.5% DTPA; the second impregnation solution contains by weight per cent 0.2% DTPA, 0.1% MgSO₄, 2.0% silicate, 1.6% TA, and 2.6% H₂O₂; and the blow line solution contains by weight per cent 0.13% DTPA, 0.13% MgSO₄, 2.5% silicate, 1.2% TA with 0.1% being residual, 2.1% H₂O₂ with 2.1% being residual.

14. The alkaline peroxide mechanical pulping process of claim 2, wherein the first impregnation solution contains by weight per cent 0.3% DTPA, 0.05% MgSO₄, 0.7% silicate, 0.2% TA, and 0.5% H₂O₂; the second impregnation solution contains by weight per cent 0.1% DTPA, 0.08% MgSO₄, 1.8% silicate, 1.4% TA, and 1.9% H₂O₂; and the blow line solution contains by weight per cent 0.22% DTPA, 0.11% MgSO₄, 1.1% silicate, 0.9% TA with 0.2% being residual, 1.2% H₂O₂ with 1.7% being residual.

15. The alkaline peroxide mechanical pulping process of claim 2, wherein the first impregnation solution contains by weight per cent 0.4% TA, 0.5% H₂O₂, 0.2% DTPA, 0.04% MgSO₄, 0.5% silicate; the second impregnation solution contains by weight per cent 0.14% DTPA, 0.05% MgSO₄, 0.5% silicate, 0.4% TA, and 0.6% H₂O₂; and the blow line solution contains by weight per cent 0.18% DTPA, 0.06% MgSO₄, 1.8% silicate, 1.2% TA with 0.1% being residual, 1.8% H₂O₂ with 1.1% being residual.

16. The alkaline peroxide mechanical pulping process of claim 2, wherein the first impregnation solution contains by weight per cent 0.4% TA, 0.6% H₂O₂, 0.18% DTPA, 0.03% MgSO₄, 0.3% silicate; the second impregnation solution contains by weight per cent 0.15% DTPA, 0.05% MgSO₄, 0.4% silicate, 0.4% TA, and 0.7% H₂O₂; and the blow line solution contains by weight per cent 1.7% TA, and 2.8% H₂O₂ with 1.1% being residual.

17. (Cancelled)

18. An alkaline peroxide mechanical pulping process comprising the steps of:

in a primary refiner having a superatmospheric casing, refining a lignocellulosic material that has been pretreated and impregnated with at least a first sodium hydroxide alkaline peroxide pretreatment solution;

discharging the lignocellulosic material at temperature of at least about 80C into a blow line having at least one solution inlet port;

injecting a sodium hydroxide alkaline peroxide blow line solution through the at least one solution inlet port;

mixing the blow line solution and the lignocellulosic material in the blow line;

discharging the lignocellulosic material from the blow line at a temperature of at least about 80C; and

maintaining the discharged lignocellulosic material for a reaction period.

19. The alkaline peroxide mechanical pulping process of claim 18, wherein the step of refining further includes adding a refiner solution of sodium hydroxide alkaline peroxide at the primary refiner.

20. The alkaline peroxide mechanical pulping process of claim 18, wherein the step of injecting an alkaline peroxide blow line solution through the at least one solution inlet port and into the blow line containing the lignocellulosic material includes injecting an alkaline peroxide intermediate line solution through, at least, one solution inlet port located immediately after the blow valve.

21. An alkaline peroxide mechanical pulping process comprising the steps of:

feeding a lignocellulosic material into a first press;

pressing the lignocellulosic material;

discharging the lignocellulosic material from the first press;

impregnating the lignocellulosic material discharged from the first press with a first sodium hydroxide alkaline peroxide pretreatment solution and maintaining the impregnation for a first reaction time;

feeding the impregnated lignocellulosic material to a refiner having an inlet and a rotating disc within a superatmospheric casing;

refining the impregnated lignocellulosic material to form a primary pulp;

discharging the stream of primary pulp from the superatmospheric casing to a blow line;

adding a sodium hydroxide alkaline peroxide blow line solution to the stream of primary pulp immediately after the blow valve;

mixing the blow line solution and the stream of primary pulp to form a reaction mixture;

discharging the reaction mixture into a retention vessel;

retaining the reaction mixture in the retention vessel to produce a bleached material.

22. The alkaline peroxide mechanical pulping process of claim 21, further comprising;

feeding the lignocellulosic material that has been impregnated with the first pretreatment solution for a first reaction time, into a second press; pressing and discharging the lignocellulosic material from the second press;

impregnating the lignocellulosic material discharged from the second press with a second sodium hydroxide alkaline peroxide pretreatment solution and maintaining the second impregnation for a second reaction time.

23. The alkaline peroxide mechanical pulping process of claim 21 further comprising adding a sodium hydroxide alkaline peroxide refiner solution to the lignocellulosic material at the refiner.

24. (Cancelled)

25. (Cancelled)

26. (Cancelled)

27. (Cancelled)

28. The alkaline peroxide mechanical pulping process of claim 21, wherein the step of feeding the impregnated lignocellulosic material to a refiner having an inlet and a rotating disc within a superatmospheric casing includes maintaining the superatmospheric casing at a pressure of at least about 240kPa.

29. The alkaline peroxide mechanical pulping process of claim 21, wherein the impregnation solution contains sodium hydroxide, peroxide, and stabilizer; the blow line solution contains sodium hydroxide, peroxide and stabilizer; and said blow line solution is at a temperature less than the stream of primary pulp.

30. The alkaline peroxide mechanical pulping process of claim 22, wherein the first impregnation solution contains by weight per cent 0.3% DTPA; the second impregnation solution contains by weight per cent 0.2% MgSO₄, 4.4% silicate, 2.8% TA, and 2.8% H₂O₂; and the blow line solution contains by weight per cent 0.16% DTPA, 0.16% MgSO₄, 2.3% silicate, 1.8% TA with 0.5% being residual, 2.4% H₂O₂ with 1.1% being residual.

31. The alkaline peroxide mechanical pulping process of claim 22, wherein the first impregnation solution contains by weight per cent 0.5% DTPA; the second impregnation solution contains by weight per cent 0.2% DTPA, 0.1% MgSO₄, 2.0% silicate, 1.6% TA, and 2.6% H₂O₂; and the blow line solution contains by weight per cent 0.13% DTPA, 0.13% MgSO₄, 2.5% silicate, 1.2% TA with 0.1% being residual, 2.1% H₂O₂ with 2.1% being residual.

32. The alkaline peroxide mechanical pulping process of claim 22, wherein the first impregnation solution contains by weight per cent 0.3% DTPA, 0.05% MgSO₄, 0.7% silicate, 0.2% TA, and 0.5% H₂O₂; the second impregnation solution contains by weight per cent 0.1% DTPA, 0.08% MgSO₄, 1.8% silicate, 1.4% TA, and 1.9% H₂O₂; and the blow line solution contains by weight per cent 0.22% DTPA, 0.11% MgSO₄, 1.1% silicate, 0.9% TA with 0.2% being residual,

1.2% H₂O₂ with 1.7% being residual.

33. The alkaline peroxide mechanical pulping process of claim 22, wherein the first impregnation solution contains by weight per cent 0.4% TA, 0.5% H₂O₂, 0.2% DTPA, 0.04% MgSO₄, 0.5% silicate; the second impregnation solution contains by weight per cent 0.14% DTPA, 0.05% MgSO₄, 0.5% silicate, 0.4% TA, and 0.6% H₂O₂; and the blow line solution contains by weight per cent 0.18% DTPA, 0.06% MgSO₄, 1.8% silicate, 1.2% TA with 0.1% being residual, 1.8% H₂O₂ with 1.1% being residual.

34. The alkaline peroxide mechanical pulping process of claim 22, wherein the first impregnation solution contains by weight per cent 0.4% TA, 0.6% H₂O₂, 0.18% DTPA, 0.03% MgSO₄, 0.3% silicate; the second impregnation solution contains by weight per cent 0.15% DTPA, 0.05% MgSO₄, 0.4% silicate, 0.4% TA, and 0.7% H₂O₂; and the blow line solution contains by weight per cent 1.7% TA, and 2.8% H₂O₂ with 1.1% being residual.

35. (Cancelled)

36. An alkaline peroxide mechanical pulping process comprising the steps of:

in a primary refiner having a superatmospheric casing, refining a lignocellulosic material that has been pretreated and impregnated with at least a first sodium hydroxide alkaline peroxide pretreatment solution into a primary pulp having a temperature in the range of about 90C to about 155C and a consistency of about 20 to about 60%;

discharging the lignocellulosic material through a blow valve into an intermediate line in fluid communication with at least a first further pulp processing apparatus for separating, cleaning, pressing, bleaching, or refining

the primary pulp and having at least one solution inlet port upstream of said further apparatus;

injecting sodium hydroxide alkaline peroxide intermediate line solution through the at least one solution inlet port at a temperature below about 80C;

mixing the intermediate line solution and the lignocellulosic material in the intermediate line upstream of said further apparatus;

discharging the lignocellulosic material from the intermediate line; and

retaining the discharged lignocellulosic material for a reaction period.

37. The alkaline peroxide mechanical pulping process of claim 36, wherein the step of refining further includes adding a refiner sodium hydroxide solution of alkaline peroxide at the primary refiner.

38. The alkaline peroxide mechanical pulping process of claim 36, wherein the step of injecting an alkaline peroxide intermediate line solution through the, at least one, solution inlet port and into the intermediate line containing the lignocellulosic material includes injecting an alkaline peroxide intermediate line solution through, at least, one solution inlet port located immediately after [[a]] said blow valve.

39. (Cancelled)

40. (Cancelled)

41. (Cancelled)

42. An alkaline peroxide mechanical pulping process comprises the steps of:

in a refiner having a casing, additionally refining a lignocellulosic based material that has been previously pretreated and impregnated with at least a first sodium hydroxide alkaline peroxide pretreatment solution and which has been

previously refined;

discharging the lignocellulosic based material through a blow valve into an intermediate line in fluid communication with at least a first further pulp processing apparatus for separating, cleaning, pressing, bleaching, or refining the primary pulp and having at least one solution inlet port upstream of said further apparatus;

injecting a sodium hydroxide alkaline peroxide intermediate line solution through the at least one solution port;

mixing the intermediate line solution and the lignocellulosic based material in the intermediate line upstream of said further apparatus;

discharging the lignocellulosic based material from the intermediate line; and

retaining the discharged lignocellulosic based material for a reaction period.

43. The alkaline peroxide mechanical pulping process of claim 42, wherein the refiner casing is superatmospheric.

44. The alkaline peroxide mechanical pulping process of claim 1, wherein more than one third of the total sodium hydroxide alkaline peroxide solution added from impregnation to the blow line inclusive, is added at the blow line.

45. The alkaline peroxide mechanical pulping process of claim 3, wherein more than one third of the total sodium hydroxide alkaline peroxide solution added from impregnation to the blow line inclusive, is added at the blow line.

46. The alkaline peroxide mechanical pulping process of claim 21, wherein more than one third of the total sodium hydroxide alkaline peroxide solution added from impregnation to the blow line inclusive, is added at the blow

line.

47. The alkaline peroxide mechanical pulping process of claim 23, wherein more than one third of the total sodium hydroxide alkaline peroxide solution added from impregnation to the blow line inclusive, is added at the blow line.

48. The alkaline peroxide mechanical pulping process of claim 36, wherein more than one third of the total sodium hydroxide alkaline peroxide solution added from impregnation to the blow line inclusive, is added at the blow line.

49. The alkaline peroxide mechanical pulping process of claim 37, wherein more than one third of the total sodium hydroxide alkaline peroxide solution added from impregnation to the blow line inclusive, is added at the blow line.

50. The alkaline peroxide mechanical pulping process of claim 5, wherein

the stream of primary pulp from the casing to the blow line includes steam and the pulp has a temperature in the range of about 90C to about 155C and a consistency of about 20% to about 60%;

the pulp in the reaction mixture is separated from the steam; and

the separated pulp is discharged directly from the separator into and retained in the retention vessel at a temperature of about 60C to about 95C and a consistency of about 20% to about 40%.

51. The alkaline peroxide mechanical pulping process of claim 50, wherein more than one third of the total sodium hydroxide alkaline peroxide solution added from impregnation to the blow line inclusive, is added at the blow line.

52. The alkaline peroxide mechanical pulping process of claim 51, comprising,

feeding the lignocellulosic material that has been impregnated with the first pretreatment solution for a first reaction time, into a second press;

pressing and discharging the lignocellulosic material from the second press;

impregnating the lignocellulosic material discharged from the second press with a second sodium hydroxide alkaline peroxide pretreatment solution and maintaining the second impregnation for a second reaction time; and

adding a sodium hydroxide alkaline peroxide refiner solution to the lignocellulosic material at the refiner.

IX. EVIDENCE APPENDIX

(No Content)

X. RELATED PROCEEDINGS APPENDIX
(No Content)